an individual child and the mean of the reference population. It uses the standard deviation of the reference population to express that distance. For example, if a child's length is located 2 standard deviations below the mean of the reference population, the z-score would be -2.0. The z-score system has several advantages over the use of percentiles or percent median. It permits the characterization of growth using all children in a sample, not just those in the extremes of the distribution. Also, as opposed to the other indices used, z-scores are normally distributed and allow a meaningful average and standard deviation to be calculated.

The information on current breastfeeding status (exclusive vs. supplemented) was used to tabulate and graph current feeding status by age in three-month age groups.

D. RESULTS

Survey demographics

The survey was conducted in all 30 selected sites in the Balochistan province. In NWFP, two clusters in tribal areas could not be visited. After identifying target women (women who had ever been pregnant), interviewing could only be done if the woman had had a pregnancy (or a birth, whether live birth or stillbirth) in the period specified. Even though target women were identified, women from an average of 20.3% of households in NWFP and 29.8% of households in Balochistan did not contribute birth histories. Reasons were mostly very young or older age. Thus, birth histories were contributed by women from 1803 out of 2305 households visited in NWFP and by women from 1112 out of 1489 households in Balochistan.

Data was collected on the outcome of 3853 pregnancies in NWFP and 2213 pregnancies in Balochistan, which ended February 1985 or later (Table 1). Of these pregnancies, 439, or 11.4% ended in a stillbirth or abortion in NWFP. In Balochistan, 193, or 8.7% ended in a stillbirth or an abortion. Information was obtained on 3021 living children under five years of age at the time of interview in NWFP, and on 1761 children under five in Balochistan. Of these, 50.7% were boys in Balochistan and 53.1% were boys in NWFP. In NWFP,

information was recorded on 437 deaths under the age of 5, which had occurred since February 1985. This number was 282 in Balochistan.

Table 1: Survey demographics

	NWFP	Balochistan
No. of households visited	2305	1489
% of households with live birth during last year	31%	34%
No. of pregnancies ending 2/85 or later	3853	2213
Mean pregnancy interval	23.5 months	22.3 months
No. of pregnancies ending in stillbirth/abortion	439 (11.4%)	193 (8.7%)
No. of pregnancies ending in a live birth	3414	2020
No. of living children <5 yrs at survey date	3021	1761
No. of boys among living children	1654 (53.1%)	926 (50.7%)
No. of deaths at age <5 2/85 or later	437 (14.5%)	282 (16.0%)

Mortality rates

Of 844 pregnancies ending between February 1989 and February 1990 in the NWFP sample, 127, or 15%, ended in a stillbirth or abortion and 717 were live births (Table 2). During the same time period, 59 children died under the age of one year. Thirty-one of these 59 children died under the age of one month. Twenty-eight children died between the ages of one and five years.

Based on these numbers, the period infant mortality rate for the refugee population in NWFP was 82.3 deaths per 1000 live births (59/717 * 1000). In NWFP, there was only a slight increase in variance related to the cluster sampling method for this estimate - the design effect (DE) for the infant mortality rate was 1.1. The 95% confidence interval for the infant mortality rate is: (61.7, 103.1). The neonatal mortality rate was 43.2 neonatal deaths per 1000 live births (31/717 * 1000). The 95% confidence interval for this rate was (27.2, 59.4). If the mortality rate of children in each annual age group under five is consecutively applied to an assumed group of 1000 live births, 119 (11.9%) of these children would have died before reaching their fifth birthday (not shown in table). The period under 5 mortality rate, another commonly used indicator, is 122.7 deaths under 5 per 1000 live births per year.

Table 2: Neonatal, infant and under 5 period mortality rates[1] and fetal wastage between Feb. 1989 and Feb. 1990

		NWFP	Balochistan	All areas[2]
No. of total births		844	477	
No. of live births		717	432	
FETAL WASTAGE	- abortions/stillbirths	127	45	
	- per 1000 total births	150.6	94.3	
NEONATAL MORTALITY	- no. of neonatal deaths	31	12	
	- rate/1000 live births	43.2	27.8	40.2
	- 95% confidence interval	(27,59)	(10,46)	(28,53)
INFANT MORTALITY	- no. of infant deaths	59	38	
	- rate/1000 live births	82.3	88.0	83.6
	- 95% confidence interval	(62,103)	(48,128)	(67,100)
UNDER 5 MORTALITY	- no. of deaths < 5	88	63	
	- rate/1000 live births	122.7	145.8	127.3

1: Period mortality rates calculated as number of deaths in time period over number of live births in time period
2: All area estimates are pooled and weighed according to each provinces relative population size

In the Balochistan sample, between February 1989 and February 1990, 45 out of 477 pregnancies ended in a stillbirth or abortion and 432 were live births. During the same period, 38 children died under one year of age, and 25 children died between one and five years of age. The infant mortality rate for Balochistan was 88.0/1000, with a considerable increase in variance related to the cluster design (design effect of 2.2). Consecutively, the 95% confidence interval (48.4, 127.5) around this estimate is much wider compared to the NWFP estimate. The neonatal mortality rate is 27.8, with a 95% confidence interval of (9.5, 46.1). Applying age-specific mortality rates to an assumed cohort of 1000 live births, 146 (14.6%, not shown) would die before their fifth birthday. The period under 5 mortality rate is 145.8/1000.

The all-area estimate, pooling data from both surveys and weighing according to the proportion of the overall refugee population sampled in each area, was 83.6/1000 (95% CI: 67.0, 100) for the infant mortality rate, and 40.2/1000

(27.9, 52.5) for the neonatal mortality rate. The under 5 mortality rate is 127.3/1000.

In this survey, special emphasis was placed on collecting dates of birth and death for each child born during the specified period. These dates allowed to reconstruct cohort infant mortality rates for the four years preceding the examined period 1989-1990. The computed rates (Table 3, Figure 1) show a consistent decline of infant mortality by for Balochistan (from 171/1000 to 111.1/1000) and for NWFP (from 130.9/1000 to 106.7/1000).

Table 3: Cohort infant mortality rates[1] for four one-year periods between February 1985 and January 1989

	N W F P			Balochistan		
	Live Births	Deaths	IMR	Live Births	Deaths	IMR
2/88-1/89	656	70	106.7	351	39	111.1
2/87-1/88	576	64	111.1	388	50	128.9
2/86-1/87	545	65	119.3	298	42	140.9
2/85-1/86	527	69	130.9	269	46	171.0

1:Cohort mortality rates were calculated using one year's birth cohort (denominator) and all deaths before the age of one year among this cohort

Probable causes of death

All deaths are tabulated by age-at-death and associated symptom according to the mother's recall in Table 4. Overall, the proportion of all deaths under five in which the mother recalled respiratory symptoms only was 42% in NWFP, larger than in Balochistan, where it was 21%. There was a substantial proportion of deaths preceded by both respiratory and diarrhoeal symptoms. This association was especially relevant for postneonatal deaths in NWFP and early childhood deaths in Balochistan. If all probable cases of neonatal tetanus were true cases, the neonatal tetanus-specific mortality rate would be 13.9/1000 for NWFP (10/716*1000) and 21/1000 for Balochistan (9/431*1000).

Table 4: Association of deaths with certain symptoms and diseases, according to mother's recall

	NWFP[1]				Balochistan			
	Neon.	PostNN	1-4 yrs	All	Neon.	PostNN	1-4 yrs	All
Only respiratory	15 (50)	9 (31)	13 (45)	37 (42)	-	5 (19)	8 (32)	13 (21)
Only diarrhea	3 (7)	5 (21)	6 (21)	14 (16)	1 (8)	7 (27)	3 (12)	11 (17)
Diarr. + resp.	3 (10)	12 (41)	8 (28)	23 (26)	2 (17)	12 (46)	11 (44)	25 (40)
Measles	-	2 (7)	1 (3)	3 (3)	-	1 (4)	2 (8)	3 (5)
Malaria	-	-	1 (3)	1 (1)	-	1 (4)	1 (4)	2 (3)
Prob. NNT	10 (33)	-	-	10 (11)	9 (75)	-	-	9 (14)
TOTAL(100%)	**31**	**28**	**29**	**88**	**12**	**26**	**25**	**63**

1: Total number of deaths and percent of total in brackets.

Diarrhea

Around 30% of all living children were reported to have had diarrhea during the previous 2 weeks in both provinces (Table 5). The proportion of children

Table 5: Diarrhea during the last 2 weeks and the last 24 hours by age groups

	NWFP		**Balochistan**	
	Last 2 weeks	Last 24 hrs	Last 2 weeks	Last 24 hrs
Under 1 year	266 (40.2%)	211 (32.1%)	153 (36.1%)	145 (34.2%)
Over 1 year	845 (29.2%)	583 (20.1%)	446 (28.7%)	408 (26.3%)
All ages	1111 (31.2%)	794 (22.4%)	599 (30.3%)	553 (28%)

Table 6: Association of bottle feeding with diarrhea during the last 24 hours among all survey children who were not exclusively breastfed

		NWFP Diarrhea last 24 hrs		
		Yes	No	Total
Bottle	Yes	30 (37.5%)	50 (62.5%)	80 (6.2%)
	No	329 (27.3%)	875 (72.7%)	1204 (93.8%)
	Total	359 (28%)	925 (72%)	1284 (100%)

Odds ratio 1.6 , 95% C.I. 0.97 to 2.63

		Balochistan Diarrhea last 24 hrs		
		Yes	No	
Bottle	Yes	49 (44.5%)	61 (55.5%)	110 (15.5%)
	No	202 (32.7%)	415 (67.3%)	617 (84.9%)
	Total	251 (34.5%)	476 (65.5%)	727 (100%)

Odds ratio 1.65, 95% C.I. 1.07 to 2.5

with diarrhea during the last 24 hours was higher in Balochistan (26.3%) compared to NWFP (22.4%). In both provinces, 2-week incidence rates and 24-hour point prevalence rates differed significantly by age: more children under one had diarrhea compared to children over one year of age. Comparing children who were bottle-fed to non-bottle-fed children who were not exclusively breastfed, bottle-fed children were more likely to have had diarrhea during the previous 24 hours. This association was statistically significant in Balochistan.

Anthropometric measurements

Weight and height measurements were performed on 505 children between one and four years from NWFP and 367 children from Balochistan (Table 7). In NWFP, 44.4% were on or above the median for weight for height of the reference population, as opposed to 31.8% in Balochistan. Below 80% of the median weight for height were only 2.0% of the children in NWFP, but 3.1% in Balochistan. These proportions correlate well with the z-score distribution of weight-for-height, where in NWFP 1.8% and in Balochistan 3.1% of children were below 2 standard deviations (Table 8, Figure 2 and 3). For height-for-age, a majority of children were below 2 standard deviations (58.2%

in NWFP and 67.3% in Balochistan). Expressing the height-for-age distribution as percent median, 42.7% in NWFP and 51.1% in Balochistan are less than 90% of the median.

Table 7: Distribution of anthropometric measurements expressed as percent of the median of the WHO/NCHS reference population

	NWFP (n=505)			Balochistan (n=367)		
	Wt./Ht.	Ht./Age	Wt./Age	Wt./Ht.	Ht./Age	Wt./Age
< 70 %	0.6%	0.2%	10.7%	0.8%	1.5%	18.1%
70% - <80%	1.4%	2.6%	21.8%	2.3%	1.5%	31.6%
< 90%	-	42.7%	-	-	51.1%	-
80% - <100%	53.6%	90.2%	57.1%	65.1%	91.3%	46.6%
>= 100%	44.4%	7%	10.3%	31.8%	5.6%	3.8%

The z-score distribution curves for weight-for-height (Figures 2 and 3) for children from both provinces are very close to the reference population. The curve for Balochistan is slightly shifted to the left; both curves are somewhat tighter around the median compared to the reference curve.

Table 8: Distribution of Weight-for-Height and Height-for-Age expressed as z-scores (standard deviation units) relative to the median of the WHO/NCHS reference population

	Weight for Height			Height for Age	
	NWFP (n=505)	Balochistan (n=367)		NWFP (n=505)	Balochistan (n=367)
Less than -2 S.D.	1.8%	3.1%	Less than -2 SD	58.2%	67.3%
-2 to < -1.5 S.D.	2.8%	7.4%	-2 to <-1 SD	24%	17.2%
-1.5 to < -1 S.D.	9.7%	14.5%	Above -1 SD	17.8%	15.5%
Above -1 S.D.	85.7%	75%			

Breastfeeding

For every live birth it was determined whether the child had ever been breastfed. This breastfeeding "initiation" rate was very high in both provinces. Only 3.1% of live births in NWFP and 1% in Balochistan had never been breastfed (not shown in table).

Information on the current feeding status by age for a mother's youngest living child was used to assess the duration of breastfeeding by determining feeding status by age, using three month age groups (Table 9 and 10, Figure 4 and 5). As shown by the initiation rate, almost all children are breastfed initially. For a considerable proportion of children, the duration of exclusive breastfeeding seems to be long - 27.6% of all children still receive breastmilk only at 9-12 months in NWFP. That proportion is 20% in Balochistan, where the proportion of children fed with a bottle is larger compared to NWFP. Bottle-feeding (whether alone or together with breast-feeding) is most prevalent during 9 to 12 months of age. In NWFP, 9% of all children in this age group receive any bottle feeding; this proportion is 27% in Balochistan.

Table 9: Current feeding status by 3-month age groups between birth and 30 months, Afghan refugee children, NWFP

Age group (months)	No. of Children	Percent[1] of children receiving: Breast only A	Breast + non-bottle supplement. B	Breast + bottle C	Bottle, no breast D	No breast E	Any bottle C+D
0 - 2	180	90%	3.7	2.8	2.2	1.1	5
3 - 5	172	82	10.5	4.7	2.3	0.6	7
6 - 8	178	54.5	36	7.3	1.1	1.1	8.4
9 - 11	123	27.6	61.8	4.9	4.1	1.6	9
12 - 14	187	10.2	77.5	1.6	1.6	9.1	3.2
15 - 17	125	7.2	76.8	1.6	1.6	12.8	3.2
18 - 20	173	5.8	60.1	2.3	2.3	29.5	4.6
21 - 23	105	3.8	43.8	0	3.8	48.6	3.8
24 - 26	104	1.9	41.4	1.9	3.9	51	5.8
27 - 39	59	0	17	0	0	83	0

1: Columns A to E are equivalent to 100%. They do not always add up due to rounding.

Table 10: Current feeding status by 3-month age groups between birth and 30 months, Afghan refugee children, Balochistan

Age group (months)	No. of Children	Percent[1] of children receiving: Breast only A	Breast + non-bottle supplement. B	Breast + bottle C	Bottle, no breast D	No breast E	Any bottle C+D
0 - 2	119	93.3	2.5	4.2	0	0	4.2
3 - 5	124	75	8.9	14.5	1.6	0	16.1
6 - 8	91	39.6	38.5	17.5	4.4	0	21.9
9 - 11	98	18	53.9	21.4	5.6	1.1	27
12 - 14	98	2	75.5	13.3	5.1	4.1	18.4
15 - 17	69	0	76.8	7.3	4.4	11.6	11.7
18 - 20	54	1.9	68.5	1.9	7.4	20.4	9.3
21 - 23	57	0	56.1	0	5.3	38.6	5.3
24 - 26	64	0	34.4	1.6	3.1	60.9	4.7
27 - 29	37	2.7	16.2	2.7	2.7	75.7	5.4

1: Columns A to E add up to 100%.

In NWFP, a small proportion of children are reportedly breastfed only after the age of one year (5.8% between 18 and 21 months); this is not so in Balochistan, where there were essentially no children reported to be exclusively breastfed after one year of age. Partial breastfeeding, however, continues until well after 2 years of age. At 27 to 30 months, around 16% of refugee children are still partially breastfed in both provinces.

E. DISCUSSION

Before discussing specific findings, some general methodological issues deserve mention. The representativeness of a sample survey depends to some degree on the quality of the sampling frame. Unfortunately, population statistics for the Afghan refugees are not very reliable. The refugee population figures used by the Commissionarate for Afghan Refugee Affairs are based on registrations for food rations and not on a regularly conducted census. Individuals are

known to hold double or multiple ration books. It is not clear, to what degree over-registration related to the food rationing system, as well as the uncontrolled recent migratory movements in and out of the camps have influenced the representativeness of the presently used population figures.

Although all "official" camps with newly arrived refugees were part of the sampling frame, many newcomers are thought to not be registered and have settled on the edge of established camps. The probability that a camp was selected into the sample was proportional to its population size. Pockets of recently arrived refugees may be under-represented in the survey.

The main reason to conduct the survey in two separate strata was that information about Balochistan had always suggested much higher mortality levels, compared to NWFP. However, estimates for Balochistan were never based on a large enough sample size. Unfortunately, the Balochistan results from this survey again are not entirely satisfactory in this regard. There are three reasons for this. First, sample size calculations had been based on a higher level of infant mortality (100/1000), using the mortality results from the 1988 diarrhoeal disease survey. Second, the proportion of households with a live birth during the last year was 34%, lower than the 40% found in all three previous surveys, resulting in a lower than expected number of live births identified. Third, infant mortality seemed to cluster more in Balochistan, compared to NWFP. All three of these reasons contributed to decrease the precision of the estimate, widening the confidence interval.

Mortality surveys based on interviewing women about their reproductive history can underestimate mortality rates due to the omission of deaths. Deaths are omitted either unconsciously, because the woman does not consider the event to have been a death (early neonatal deaths, especially those related to prematurity and low birthweight), or consciously - because of a cultural reluctance to talk about death, or the fear of legal consequeneces (i.e., death was not registered). Another problem in mortality surveys in the developing world is the difficulty of dating births and deaths to arrive at accurate ages. The more complete a woman's pregnancy history can be ascertained in a retrospective survey, the more realistic will the derived mortality rate be.

Interviewers in previous CDC-assisted surveys had been trained to go through a complete pregnancy history with each woman orally, without recording this history. Much emphasis had been placed on dating births and deaths with a calendar of local events. Summary sheets had been used for data collection which centered on a single child (whether living or dead). Data about an individual woman's reproductive history were not recorded. It was not possible to check whether or not an interviewer had probed into a suspiciously long

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Evaluation of Infant Mortality and Childhood Nutritional Status Among Afghan Refugees in Pakistan, 1990

Rudolf H. Tangermann, MD
Elsie Pamuk, PhD

Centers for Disease Control

In collaboration with staff of the
United Nations High Commissioner for Refugees and
Medecins Sans Frontieres, Holland,
in Islamabad, Peshawar and Quetta, Pakistan

birth interval. In the 1990 survey, a truncated complete pregnancy history was elicited and recorded. Supervisors were able to check unusually long or short birth intervals in the field. Since all important parameters of interest in this survey depended on accurate age information, major emphasis was placed on dating events with an updated calendar of events. Although the methodology used did not essentially differ from the previous surveys, the changes in the design of the actual data collection may have led to a more complete enumeration of births and deaths, thereby allowing the calculation of more realistic mortality rates.

Mortality results from the 1984-86 series of surveys do not tie in well with results from this survey (Figure 1). The all-area infant mortality estimate from this survey is almost identical to the all-area estimate in 1986, suggesting no decline of infant mortality over four years, which is unlikely. Assuming there was a further decline, either the 1986 estimate is too low or the new estimate is too high. The former is more likely, especially when considering the trend information in Figure 1, Table 3. The retrospective cohort mortality data from this survey suggest the same decline of infant mortality over a period of four years which the 84-86 series showed over only two years.

Two other observations support the assumption that the 1986 mortality rate may have underestimated true mortality levels. In commenting on the unusually fast decline of mortality, the authors of the 1986 report recommend a quality control component for future surveys. Also, during 1984 to 1985, no major improvement or change in the interventions and services offered by the refugee health care system occurred, to which such a dramatic improvement could be attributed. Infant mortality estimates from the 1988 and 1989 diarrhoeal disease surveys in both provinces also suggest very little decline of mortality between 1986 and 1989, if the trend from the 84-86 surveys was real. Finally, the improvements in the design of the 1990 survey may have resulted in more compete ascertainment of deaths, resulting in more realistic mortality rates, compared to 1986.

The information on death-associated symptoms (Table 4) does not represent cause-specific mortality rates for two reasons. First, the "verbal autopsy" used to elicit the associated symptoms and conditions from the mother was necessarily short and did not go into great detail. Second, numbers of deaths are too small to allow the calculation of representative cause-specific mortality rates. Thus, the distribution of deaths by age and recalled symptoms can only suggest a possible underlying cause. Respiratory symptoms were not asked in previous surveys. In this survey, they were associated with the majority of all deaths under five, although often in combination with diarrhea. In these cases it is unclear which condition was the main contributor to the child's death.

Acute respiratory infections (ARI) are known to be among the most common child health problems in Afghan refugee children; our data indicates that ARI's may also play a major role in early childhood mortality. If all cases of suspected neonatal tetanus were true cases, the tetanus-specific mortality rate would not have changed from 1986. Although the percentage of women of childbearing age who have received 3 doses of tetanus toxoid has increased substantially since 1986 the percentage of women adequately immunized at time of delivery remains low. Coverage surveys supervised by UNHCR have determined that the percentage of women fully immunized at time of delivery was 41% in NWFP in 1989 and 30% in Balochistan in 1990.

Questions on the two-week incidence and 24-hour point prevalence of diarrhea were included in this survey. As opposed to previous diarrhoeal disease surveys (CDD surveys), the 2-week rates were very similar for both provinces (around 30% of all children). That rate had been 45.8% in Balochistan (survey conducted December 1988 to January 1989) and 21% in NWFP (survey period November 1988 to March 1989). These differences cannot be readily explained, but may be related to seasonality factors. The 24-hour rate was higher in Balochistan, compared to NWFP. Also, we documented that all rates were significantly higher in under 1-year olds compared to children over 1. We also confirmed the known association between bottle-feeding and diarrhoea among refugee children, which should motivate health workers to continue to strongly discourage any bottle-feeding.

The results of the anthropometric assessment (Tables 7 and 8) were in keeping with previous surveys and confirmed that acute malnutrition, as indicated by the proportions of children below 80%, or below two standard deviations of the median of the reference population, is not a problem. However, those children between minus 2 and minus 1.5 standard deviations (2.8% in NWFP and 7.4% in Balochistan) can be considered borderline malnourished. Compared with children above minus 1 standard deviations they are at greater risk for acute malnutrition as well as for severe disease or early death.

In a developing country it is not uncommon to find a large proportion of children who are short for height (with linear growth retardation, or "stunting", Table 7 and 8, Figure 3). Although there is an ongoing debate about the underlying causes and significance of stunting (environmental vs. genetic influences), large proportions of growth-stunted children should be considered a problem. It has repeatedly been shown that children from developing countries who were raised in more affluent Western countries reached a growth potential very similar to local children. Also, longitudinal studies have shown that several risk factors contribute to stunting, starting very early in life. All of them are documented in this survey: prolonged periods of exclusive

breastfeeding with delayed introduction of supplementary foods, repeated infections, especially repeated dirrhoea episodes (often associated with bottle feeding), as well as a qualitatively poor diet.

The assessment of current feeding status relied on the "current status" method of measuring duration of breastfeeding. Although children were grouped into 3-month age groups, the number of children per age group is still relatively small and changes from month to month. The long reported periods of exclusive breastfeeding, as well as the long periods of overall breastfeeding, are not unusual when compared to Pakistani children; however, the relatively long "tail" of exclusive breastfeeding for NWFP seems rather unlikely. It is possibly related to a misunderstanding of the question, or to interviewer error. Almost 10% of children in NWFP and 27% in Balochistan are bottle-fed at nine months of age. There was also a statistically significant correlation with diarrhea. Bottle-feeding is more prevalent than expected. Renewed health education efforts warning mothers about the risks of bottle-feeding are needed.

F. RECOMMENDATIONS

I. FURTHER MORTALITY REDUCTIONS

Reducing deaths due to neonatal tetanus

- Renewed efforts to prevent neonatal tetanus are needed; a NNT survey, possibly in conjunction with a survey of infant growth and infant feeding practices, could verify the relatively high levels of NNT suggested by this survey. Coverage levels of women of reproductive age with tetanus toxoid should be increased. Programs to train birth attendants in semi-sterile delivery techniques should be evaluated and strengthened. Mothers should be educated about the risk of NNT and the need to deliver under as clean conditions as possible.
- Most other neonatal deaths are most likely related to low birthweight due to intrauterine growth retardation and prematurity; these deaths depends on improving maternal diet during pregnancy and increasing coverage with antenatal care.

Reducing deaths related to acute respiratory infections:

- Plan and carry out case-management training in acute respiratory infections for health workers as well as health education messages for parents about the symptoms, signs and need for early referral of children with acute respiratory infection; when WHO survey guidelines become available, consider the feasibility of an ARI survey.

Reducing deaths related to diarrhoea:

- The existing CDD program needs strengthening; a standard policy for the prevention and management of diarrhoea in the home as well as on the treatment at the health facility needs to be formulated. Oral rehydration salt should be available at all health facilities. Health education efforts should concentrate on messages about the risk of bottle-feeding, especially in Balochistan.

Reducing deaths from other causes:

- Deaths related to measles and other causes made up a small proportion of all deaths in this survey. Major measles outbreaks have not occurred and need to be prevented in the future by maintaining and increasing present immunization levels.

II. IMPROVING NUTRITION

Long durations of exclusive bottle-feeding

- The introduction of supplementary foods occurs much later than the recommended 4 to 6 months in both provinces. Health education messages need to teach mothers about the need to introduce good supplemental foods early to maintain the child's growth and general health.

Bottle feeding

- New ways need to be found to educate mothers about the dangers of bottle-feeding and its association with repeated episodes of diarrhoea, growth problems and increased risk of early death.

Linear growth retardation (stunting)

- This problem is multi-factorial and not amenable to a few interventions. However, health workers and parents should be educated about growth problems and the long-term deleterious effect on growth of prolonged exclusive breastfeeding, repeated infections and a qualitatively poor diet.

III. RECOMMENDED FURTHER EVALUATIONS

Future mortality and nutrition surveys

- Mortality levels probably decreased between 1986 and 1990. Further declines are possible but will occur at a slower speed and will depend on improvements in interventions and health services. In the absence of

an acute malnutrition problem, and unless unexpected emergencies occur, a repeat survey will not need to be done until early 1992.

Survey on infant feeding and growth

- The finding of prolonged exclusive breastfeeding was unexpected. Since infants were not included in the anthropometric assessment in the 1990 survey, an evaluation of weight for age and feeding status of children under one year and of maternal knowledge, attitude and practices regarding childbirth, infant care and nutrition is proposed. The results of such a survey will lead to a better understanding of the interaction of feeding practices and growth before age one among infants in refugee families and should enable targeted health education efforts about appropriate breastfeeding and supplementary feeding practices.

IV. COLLABORATION BETWEEN CDC AND UNHCR PAKISTAN

Mortality and nutrition surveys

- For a repeat survey, an attempt should be made to limit the role of a CDC consultant to assist with survey design and data analysis only. The raw data was sent from Pakistan to Atlanta for data entry and analysis for the 1990 survey which caused considerable delay in the analysis and preparation of a final report. Field work and data entry for the next survey should be done without CDC participation; the compiled dataset could be sent to Atlanta for further analysis. To enable local personnel to computerize survey data, training of UNHCR and MSF staff in the use of the EPI-Info software occurred during both consultancies in 1990.

Infant feeding and growth survey

- For the proposed survey on infant feeding and growth we suggest to consult with CDC personnel in the Division of Nutrition about necessary sample size and questionnaire content and format.

G. TABLES

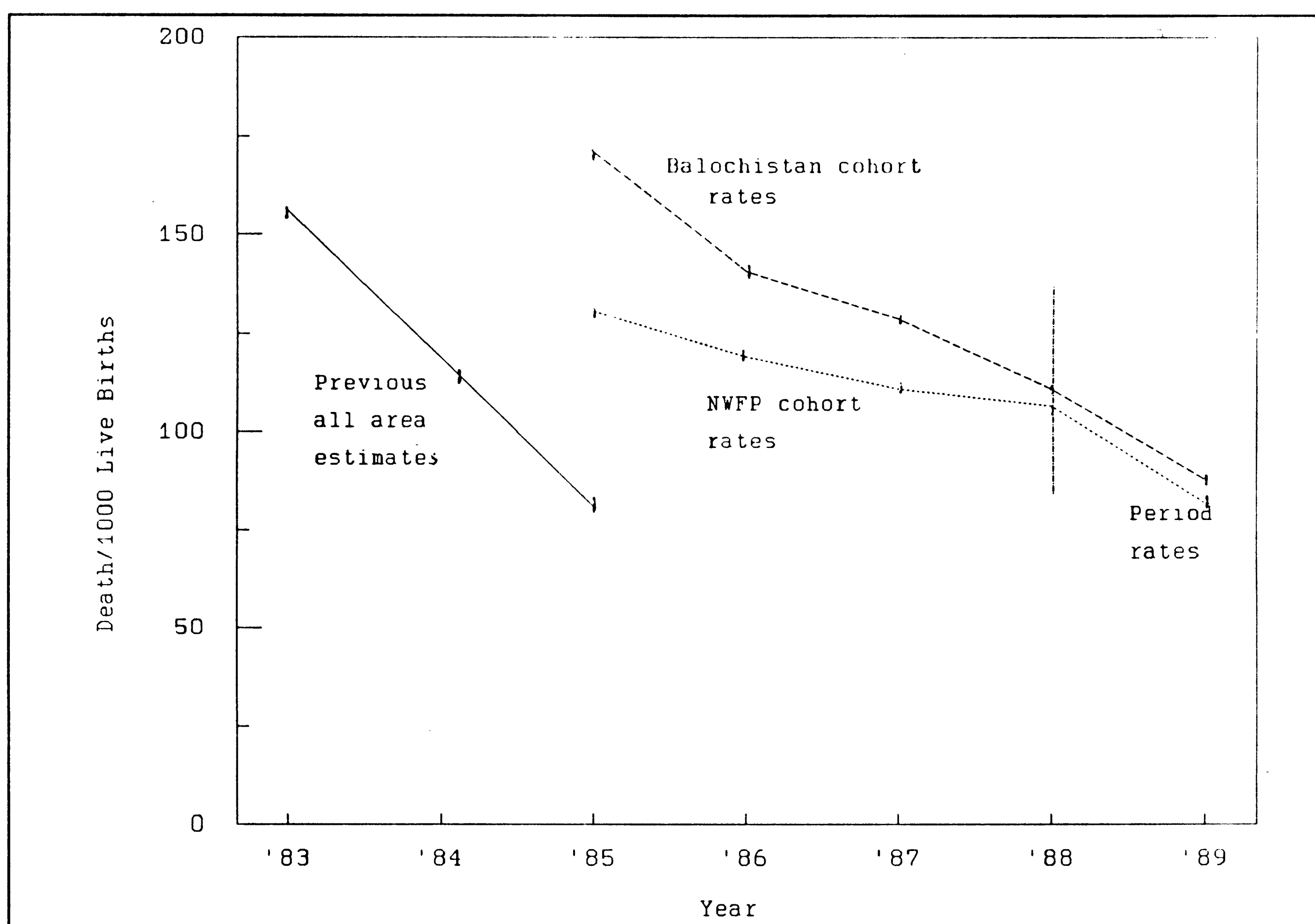


Figure 1: Infant Mortality 1983 to 89 among Afghan refugee children in Pakistan

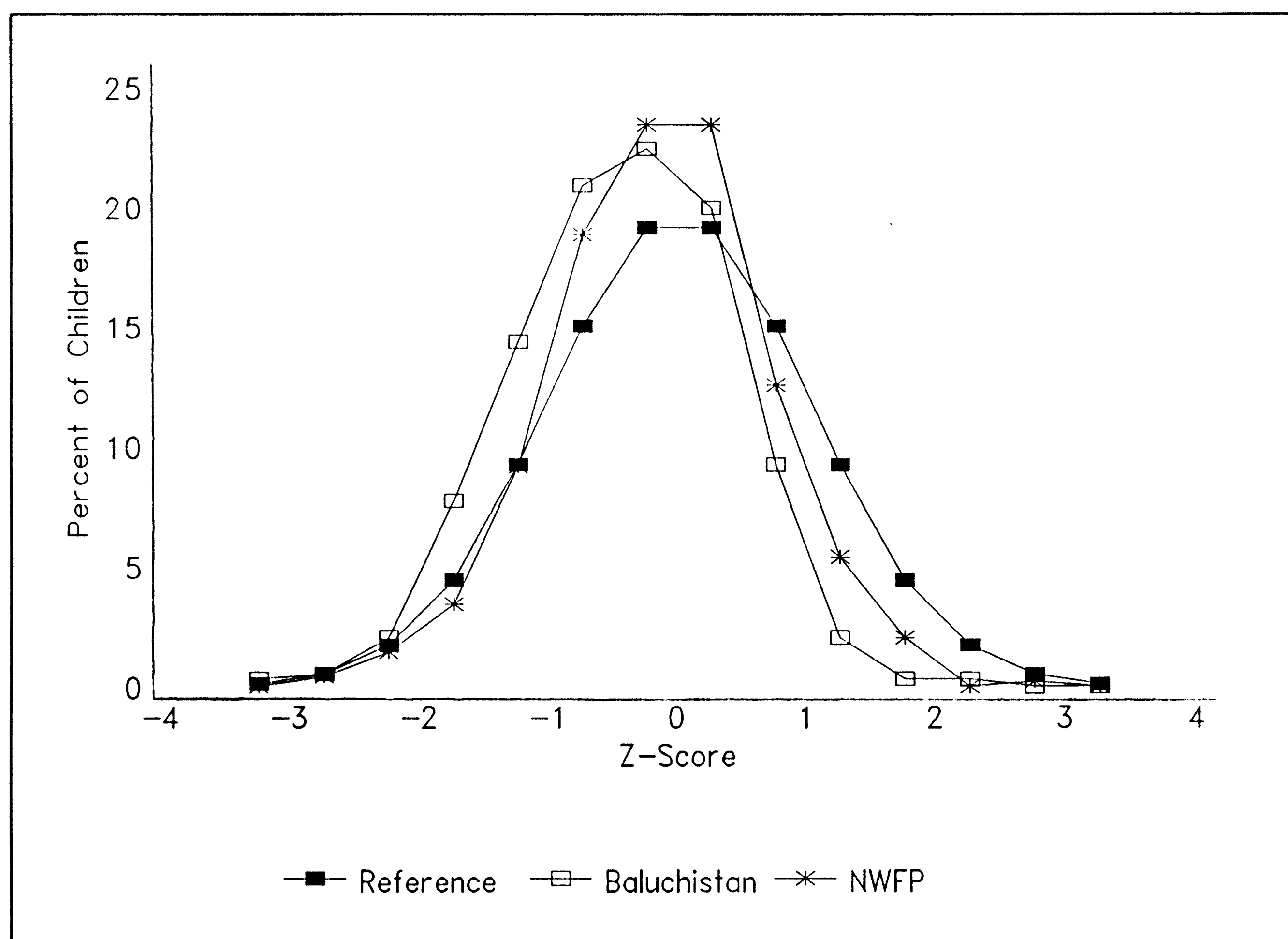


Figure 2: Z-score distribution of weight-for-height among children 1 to 4 years in both provinces relative to the WHO/NCHS reference population

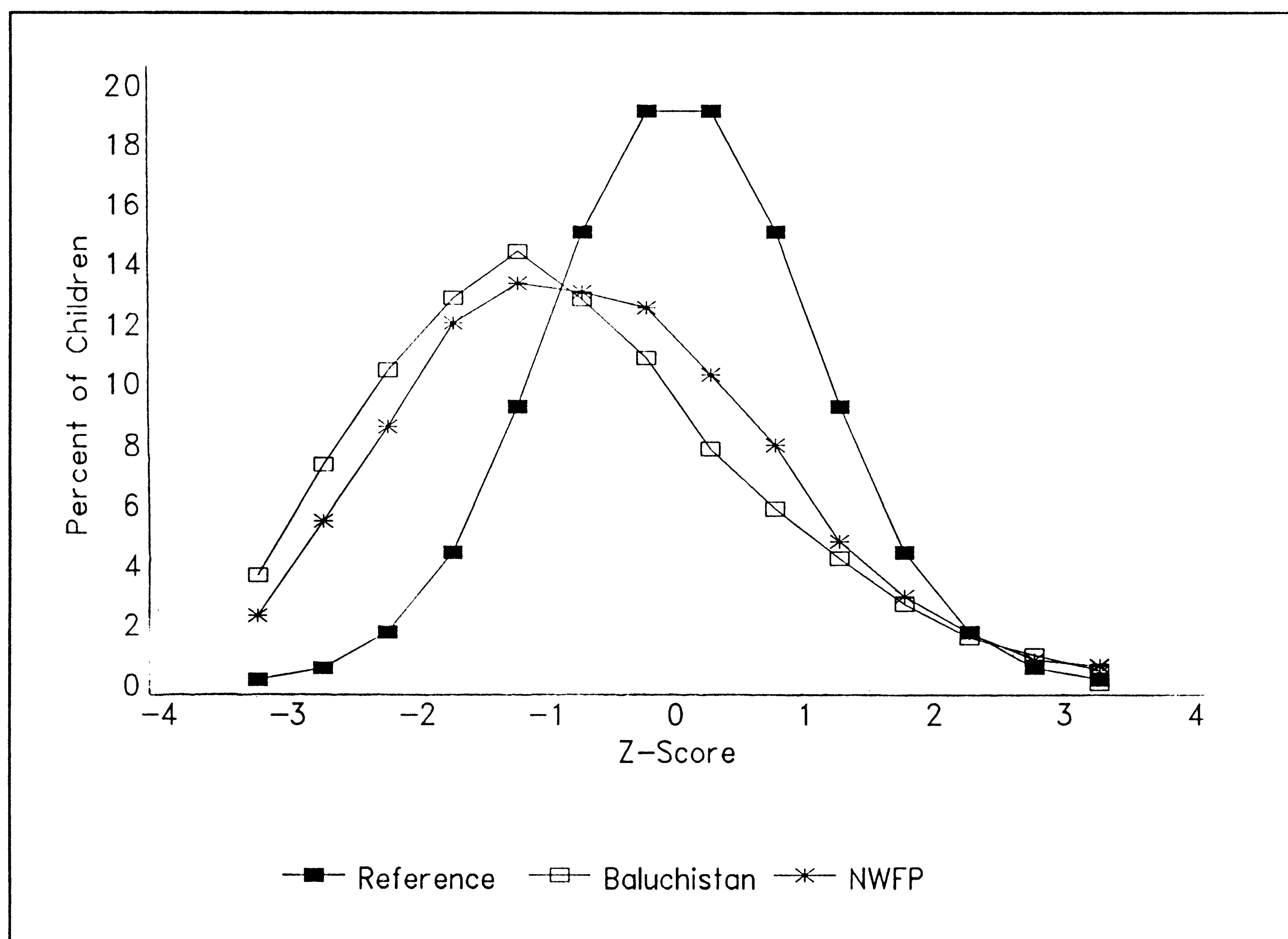


Figure 3: Z-score distribution of height-for-age among hcildren 1 to 4 years in both provinces relative to the WHO/NCHS reference population

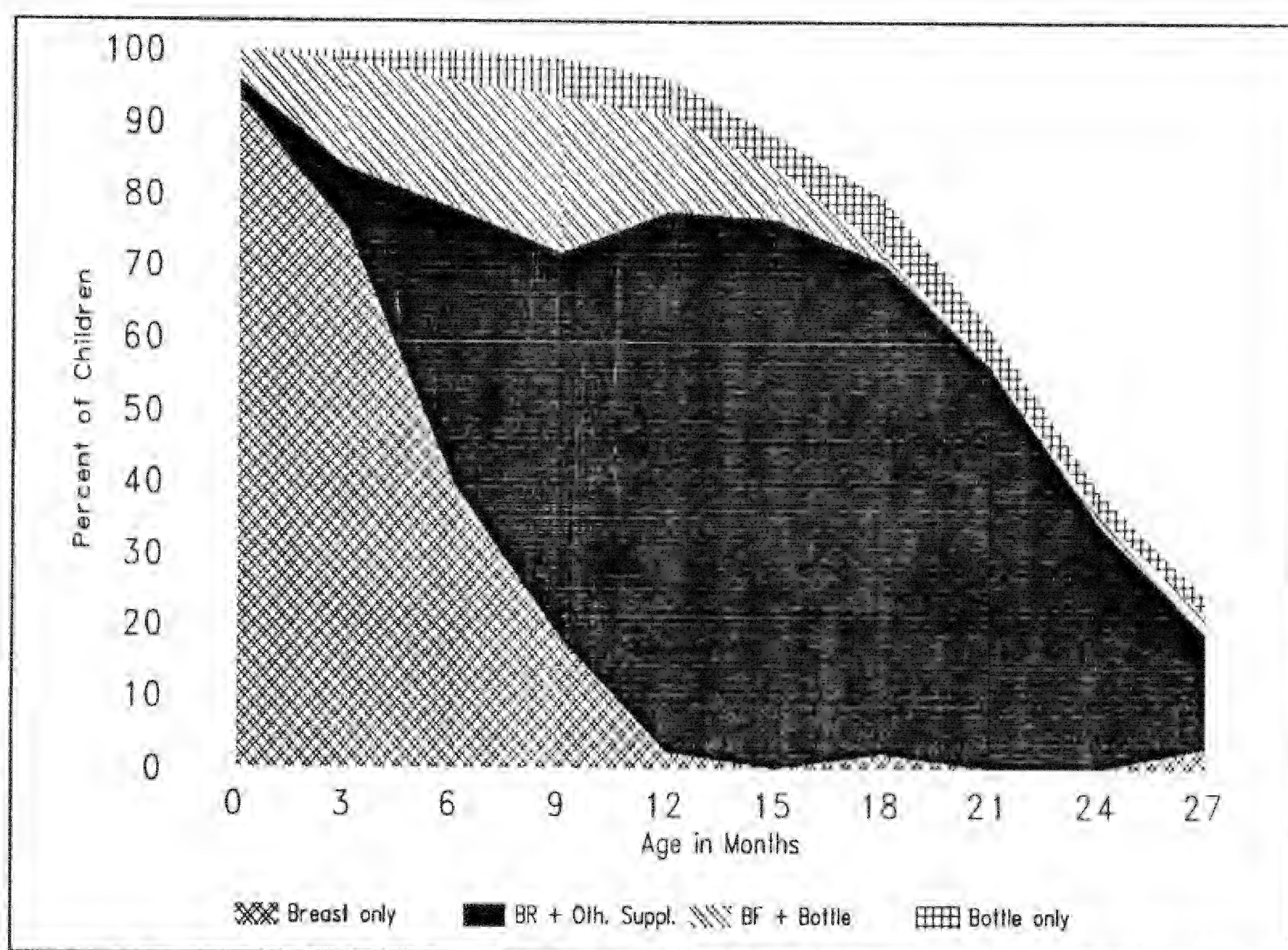


Figure 4: Current feeding practices in 3-month age groups, Afghan refugee children, Balochistan

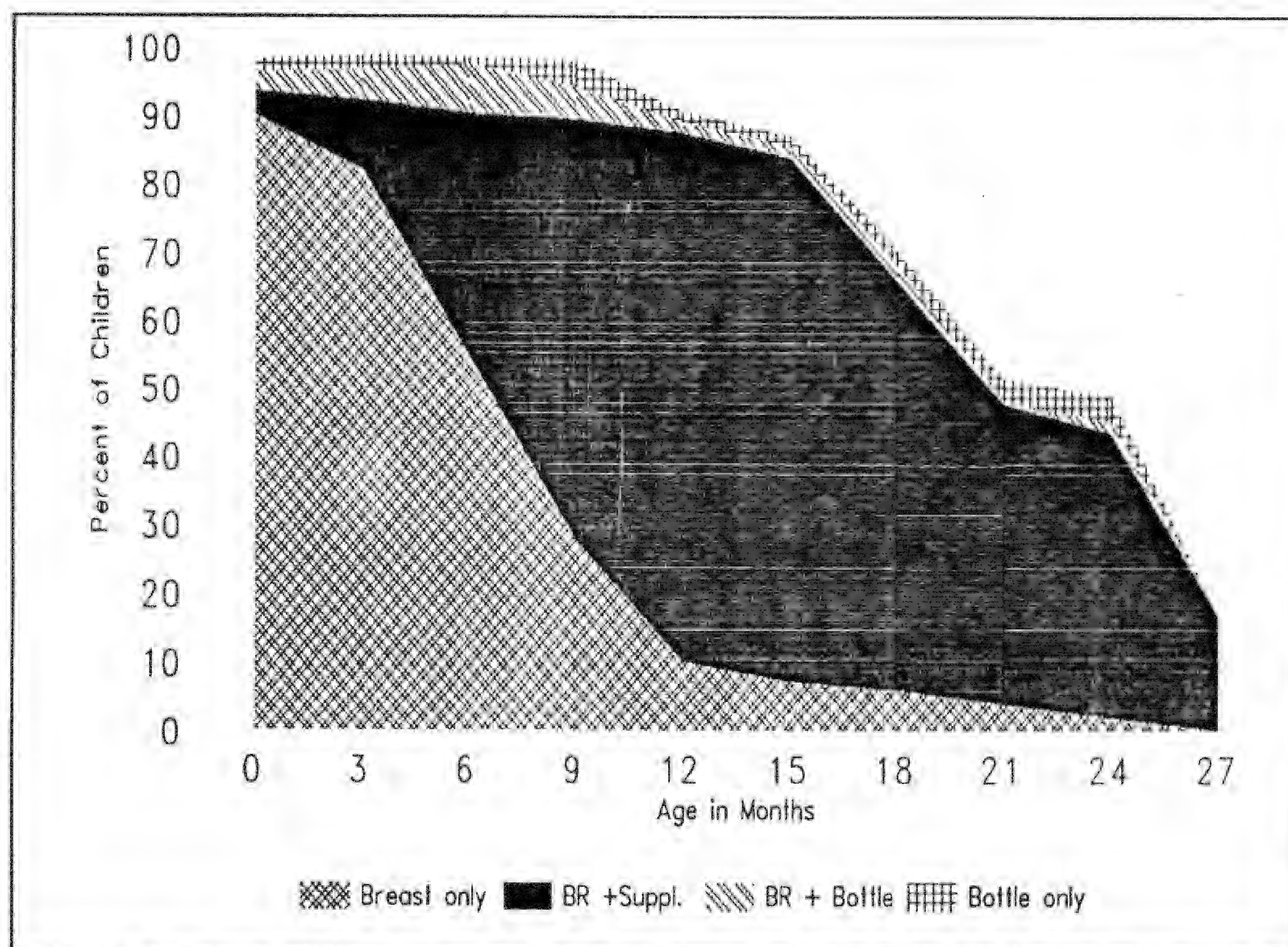


Figure 5: Current feeding practices in 3-month age groups, Afghan refugee children, North West Frontier Province

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H. APPENDICES

APPENDIX I: The questionnaire.

Group leader:________________________

Husband's name:______________________

UNHCR MORTALITY AND NUTRITION SURVEY 1990
Mother Form

Date __/__/__	Interv. ID [__¦__]	Cluster____________	Cluster No. [__¦__]
Household No. [__¦__]	Mother name ____________________		Mother ID [___]

-->	Beginning with the last pregnancy, ask for each pregnancy:							
			Pregnancy					
			1	2	3	4	5	6
			last	before	before	before	before	before
Q1	When did this pregnancy end?	enter month and year	__¦__	__¦__	__¦__	__¦__	__¦__	__¦__
	If pregnancy ended before February 1984, STOP - GO TO NEXT HOUSEHOLD/WOMAN.							
Q2	Did the baby cry after birth?	YES = 1 NO = 2						
	If "NO", go back to Q1 for pregnancy before. If "YES", continue with Q3.							
Q3	Is this child still living?	YES = 1 NO = 2						
	If "YES", go to Q5. If "NO", continue with Q4.							
Q4	When did the child die?	Enter month and year	__¦__	__¦__	__¦__	__¦__	__¦__	__¦__
	If child died before February 1989, go back to Q1 for pregnancy before. If child died February 1989 or later, continue with Q5.							
Q5	Child's name							
Q6	Child's sex	M=1 , F=2						
Q7	Ever breastfed?	Yes=1 ¦ No=2						
Q8	Child ID number	Give No. 1-6						
	--> For DEAD CHILD, go to DEATH FORM now.							
	--> For LIVING CHILDREN: - go on with Q9.							

UNHCR MORTALITY AND NUTRITION SURVEY 1990
Living Child Form

Date __/__/__	Interv. ID [__¦__]	Cluster ______________	Cluster No. [__¦__]
Household No. [__¦__]	Mother name ______________________		Mother ID [___]

-->	Fill out one column for each living child with ID number in Q8:						
-->	Child ID	Copy from Q8					
Q9	Diarrhea in past two weeks?	Yes=1 ¦ No=2					
Q10	Diarrhea last 24 hours?	Yes=1 ¦ No=2					

-->	If child is aged 1 to 4 yrs (born between February 1985 and February 1989), enter "X". Circle every 4th "X".						
Q11	Weight	In kg (Ex.:"10.7")					
Q12	Height	In cm (Ex.:"114.2")					

QUESTIONS Q13 TO Q16 ONLY FOR CHILDREN WITH ID NUMBER "1" WHO WERE EVER BREASTFED. (Check Q7)

Q13	Breastfeed now?	Yes=1 ¦ No=2	
	If child not breastfed now, go to Q15. If breastfed now, go on with Q14.		
Q14	Only breastmilk or combination?	Only breast =1 Breast + fluids =2 Br. + fl. + sol.=3	
-->	If breastmilk only, go to Q1 for next pregnancy. If combination, go on with Q15.		
Q15	Feed with bottle?	Yes=1 ¦ No=2	
-->	If mother does not use bottle, go to Q1 for next pregnancy. If mother uses bottle, go on with Q16.		
Q16	What is in bottle most of the time?	Use code number below.	
	Animal milk=1, Formula=2, Oth. milk powder=3, Water=4, Tea=5, Other=6		

--> Go to Q1 for next pregnancy.

UNHCR MORTALITY AND NUTRITION SURVEY 1990 Death Form			
Date __/__/__	Interv. ID [__¦__]	Cluster__________	Cluster No. [__¦__]
Household No. [__¦__]	Mother name__________________		Mother ID [___]

--> Child ID		Copy from Q8				
Q17	Age at death	Number of days, months, years				
Q18	Age at death (in days, in months, in years?)	Days=1, months=2, years=3				
--> Before death, did child have:						
Q19	Diarrhea during the last seven days?	Yes=1, No=2, Unkn. = 9				
Q20	Trouble breathing during the last seven days?	Yes=1, No=2, Unkn. = 9				
Q21	Coughing during the last seven days?	Yes=1, No=2, Unkn. = 9				
Q22	Malaria during the last two weeks?	Yes=1, No=2, Unkn. = 9				
Q23	Measles during the last four weeks?	Yes=1, No=2, Unkn. = 9				
--> Only ask Q24 to Q27 if child died before 40 days after birth.						
Q24	Suck normally after birth?	Yes=1, No=2,Unkn.=9				
Q25	Stop sucking before death?	Yes=1, No=2,Unkn.=9				
Q26	Jerking, stiff bef. death?	Yes=1, No=2,Unkn.=9				
Q27	Trouble opening mouth?	Yes=1, No=2,Unkn.=9				

--> Go to Q1 for next pregnancy.

APPENDIX II:The calendar of local events and festivals used to date births and deaths.

Month	Persian Calendar	Season/Crops	1984	1985	1986	1987	1988	1989	1990
January 01	22-Jedi	Rice / Cotton harvest	6-Duame Khor	24-Dreyume Khor	13-Dreyume Khor	3-Dreyume Khor	21-Tsalorum Khor	10-Tsalorum Khor	29-De Khorda:
February 02	22-Delwa		5-Dreyume Khor	23-Tsalorum Khor	13-Tsalorum Khor	2-Tsalorum Khor	20-De Khorda:	9-De Khorda:	23-Shab-e-Meraj 27-Barat
March 03	22-Hut	Wheat harvest	4-Tsalorum Khor	21-Nawuz 22-De Khorda:	12-De Khorda: 21-Nawuz	1-De Khorda: 21-Nawuz 27-Shab-e-Meraj 30-Barat	16-Shab-e-Meraj 19-Barat 21-Nawuz	5-Shab-e-Meraj 8-Barat 21-Nawuz 23-Shab-e-Barat.	12-Shab-e-Barat 21-Nawuz 26-Rosah
April 04	22-Hamal		3-De Khorda: to: Allah miasnte 29-Shab-e-Meraj	17-Shab-e-Meraj 21-Barat	6-Shab-e-Meraj 11-Barat 28-Shab-e-Barat	19-Shab-e-Barat 29-Rosah	2-Shab-e-Barat 18-Rosah	6-Rosah	26-Kuchnai Akhter
May 05	22-Saur		2-Barat 16-Shab-e-Barat	5-Shab-e-Barat 20-Rosah	10-Rosah	28-Kuchnai Akhter 29-Jumat-ul-Wida 30/31-Eid-ul-Fitr	13-Jumat-ul-Wida 18/19-Eid-ul-Fitr 18-Kuchnai Akhter	5-Jumat-ul-Wida 7/8-Eid-ul-Fitr 7-Kuchnai Akhter	
June 06	22-Jowzah	Rice - Cotton	1-Rosah 29-Jumat-ul-Wida 31-Kuchnai Akhter 1/2-Eid-ul-Fitar	14-Jumat-ul-Wida 20-22 Eid-ul-Fitr 20-Kuchnai Akhter	6-Jumat-ul-Wida 9-10-Eid-ul-Fitr 10-Kuchnai Akhter	28-Maini	17-Maini	6-Maini	
July 07	22-Sartan		30-Maini	19-Maini	9-Maini	27-Lui Akhter	16-Akhter 24-Haj 25/26 Eid-ul-azha	5-Lui Akhter 13-Haj 14/15 Eid-ul-azha	
August 08	22-Asad		29-Lui Akhter	16-Lui Akhter 26-Haj 27-29 Eid-ul-azha	6-Lui Akhter 15-Haj 16/17 Eid-ul-azha	5-Haj 6/7 Eid-ul-azha 26-Hussan Hussein	15-Hussan Hussein 23/24-Ashura	4-Hussan Hussein 12/13-Ashura	
September 09	22-Sunbullah		6-Haj 7/9-Eid-ul-azha 28-Hussan Hussein	17-Hussan Hussein 24-Ashura	7-Hussan Hussein 15-Ashura	4-Ashura 25-Separa	12-Akri-Char-Sh. 14-Separa 24-Eid-I-Milad	3-Separa 27-Akri-Char-Sh.	
October 10	22-Mezan	Wheat Sowing	5/6-Ashura 27-Separa	16-Separa	6-Separa 29-Akri-Char-Sh.	21-Akri-Char-Sh. 24-Lumray Khor	13-Lumray Khor	2-Lumray Khor 13-Eid-I-Milad	
November 11	22-Aqrab		21-Akri-Char-Sh. 26-Lumray Khor	13-Akri-Char-Sh. 15-Lumray Khor 25-Eid-I-Milad	5-Lumray Khor 14-Eid-I-Milad	4-Eid-I-Milad 23-Duame Khor	12-Duame Khor	1-Duame Khor 30-Dreyume Khor	
December 12	22-Qaus	Rice Cotton Harvest	6-Eid-I-Milad 25-Duame Khor	14-Duame Khor	4-Duame Khor	22-Dreyeme Khor	11-Dreyeme Khor	29-Tsalorum Khor	

A. SUMMARY

A survey of early childhood mortality and nutritional status was carried out among Afghan refugees in the North West Frontier Province and Balochistan Province, Pakistan.

The all-area mortality rate estimates for 1989/90 were 83.6 deaths per 1000 live births for infant mortality (95% confidence interval: 67,100), 40.2 deaths per 1000 live births for neonatal mortality (95% confidence interval: 27.9, 52.5), and 127.3 deaths under the age of five per 1000 live births (under five mortality rate), respectively. These figures are high; however, they are comparable in a regional context and lower than the most recent mortality estimates (1988) from Pakistan (infant mortality rate of 108/1000, under five mortality rate of 166/1000, from: The State of The World's Chidren 1990, UNICEF).

The most common symptoms associated with a death under five as remembered by the mother were diarrhea and respiratory symptoms. An association with respiratory symptoms was found in 68% of all deaths under five in NWFP and in 61% in Balochistan. Forty-two percent of all under-five deaths in NWFP were associated with diarrhoea; this percentage was 57% in Balochistan. Large proportions of deaths are associated with both diarrhoea and respiratory symptoms: 26% in NWFP and 40% in Balochistan. For further mortality reductions, refugee health programs will have to strengthen the control of acute respiratory infections and diarrheal disease.

The proportion of neonatal deaths associated with symptoms of tetanus does not seem to have decreased relative to 1986. If all deaths associated with tetanus symptoms were true tetanus cases, the neonatal tetanus-specific mortality rate would be 13.9 deaths per 1000 live births in NWFP and 21 deaths per 1000 live births in Balochistan, slightly higher than the tetanus mortality rate estimate from the 1986 survey. Further reducing neonatal mortality will require increased efforts to improve tetanus toxoid coverage among women of reproductive age and to increase the proportion of women delivering under the care of a trained attendant.

As in the previous surveys, levels of acute malnutrition are very low. Children between 1 and 4 were considered acutely malnourished, if they were below two standard deviations of the median weight-for-height of the reference population. Only 1.8% in NWFP and 3.1% in Balochistan fell into this category. However, 2.8% of measured children in NWFP and 7.4% in Balochistan were between -2 and -1.5 standard deviations and can be considered borderline malnourished. A large proportion of measured children between 1 and 4 were small for age, or stunted. In NWFP, 57.9%, and in Balochistan, 67.4% fell below two standard deviations of height-for-age compared to the reference population.

In NWFP, 22.3% of children were reported to have had diarrhea during the last 24 hours. This point prevalence rate was 28% in Balochistan. Bottlefed children in both provinces were more likely to have had diarrhea during the last 24 hours compared to children who were not bottle-fed. This correlation was statistically significant for Balochistan.

Almost all newborns are breastfed for some time. Current breastfeeding status by age indicates long durations of breastfeeding. Reported periods of exclusive breastfeeding are unusually long. In NWFP, 28% of infants are reported to be exclusively breastfed at the age of 9 to 12 months. This proportion is 18% in Balochistan. Bottle-feeding is somewhat more common in Balochistan (27% of infants bottle-fed at the age of 9 to 12 months) compared to NWFP (9% bottle-fed at the age of 9 to 12 months). Health education programs need to teach mothers that prolonged exclusive breast-feeding beyond the age of six months is the main cause of early growth-faltering and that any bottle-feeding can lead to repeated serious diarrhoea episodes.

B. INTRODUCTION

In January 1990, the United Nations High Commissioner for Refugees (UNHCR) requested assistance from the Centers for Disease Control (CDC), US Public Health Service, to conduct a survey of levels of mortality, nutritional status and feeding patterns in early childhood among Afghan refugees in Pakistan. CDC had assisted to carry out similar surveys in 1984, 1985 and 1986.

The 1986 survey, as well as a 1988 diarrheal disease survey, had indicated that mortality levels among refugees in Balochistan were higher, compared to NWFP. In 1986, the limited size of the sample from Balochistan had not allowed to arrive at precise enough estimates. For this reason, the new survey was conducted in two separate strata in both provinces during February/March 1990 in the North West Frontier Province (NWFP) and Balochistan Province.

C. METHODS

Sampling

The two sampling frames consisted of all Afghan refugees in NWFP/Punjab and Balochistan, respectively. At survey date, the Balochistan refugee population was believed to approximate 800,000, that of NWFP/Punjab was thought to be around 2.5 million. The official February 1990 government rosters of refugee camps, containing numbers of families and total population, were used to select the sample.

The sample consisted of 30 clusters or sample sites in Balochistan and 32 clusters in NWFP/Punjab. These were selected during a first stage of sampling from government refugee population lists using a method which gave each camp a selection probability proportional to its size. Thirty-two clusters were selected for NWFP/Punjab to warrant an adequate sample size should there be access problems in tribal areas.

Sample size calculations were performed, based on the expected levels of infant mortality and the desired statistical precision. The anticipated amount

of field work was dependent on the expected number of live births during the last year. All three past surveys had found an average of 0.4 under-one-year-olds per household (i.e., a child born during the last year was found in 40% of households). With mortality levels in Balochistan expected to be substantially higher compared to NWFP, a fixed number of 50 households in Balochistan and 80 households per cluster in NWFP/Punjab was visited.

Most camps are large, with population sizes of several thousand refugees. The target population of the survey were all women who had ever been pregnant. In an attempt to give an equal selection probability to each of those women in a given camp, an initial household was selected using a second and third stage of sampling. The second stage consisted of selecting one segment of the camp, again with a selection probability proportional to its population size. This was accomplished by using existing camp statistics and maps to partition the camp into segments. One segment was chosen, again with a selection probability proportional to its presumed population. Once a segment had been selected, the initial household was selected in a third stage of sampling with standard immunization coverage survey methodology..

The boundary of the segment was identified as clearly as possible (natural boundaries, roads, paths). Then, a disk was spun in the center of the segment to determine a random direction. The team supervisor moved in that direction on a line as straight as possible between the center and the identified segment boundary. All doors of houses and compounds between the center and the edge were counted. A random number between 1 and the number of doors identifed was selected. Interviewing started in the structure with that number. Most refugees live in walled compounds, which can house one or more families or household. For the purpose of this survey, a household was defined as a group of people sharing the same kitchen facilities. This was usually a "nuclear" or extended family (i.e., husband and one or more wives), but could also contain additional household members supported by this family (widowed women, orphaned children, etc.).

All females in each household in the compound, who had ever been pregnant, were interviewed. After all eligible women in a given compound had been interviewed, the next compound to visit was the one with its door closest to the previous one. Interviewing continued until the necessary number of

households had been visited. If a compound was obviously deserted (as was the case in several camps in Balochistan), it did not "count" and was replaced by the next compound. If an eligible woman was not at home, but was thought to be back later in the day, a callback visit was made during the day to complete the interview. If it was determined that a woman would be absent for more than a day, no further attempts to interview her were made, and the interviewer moved on to the next household or woman.

Questionnaire

After consultation with UNHCR staff a survey instrument was prepared which contained modules on a woman's reproductive history during the last five years, on breastfeeding, and on anthropometric measurements (see Appendix I). The questionnaire was designed to contain information given by one eligible woman, which meant that there could be more than one questionnaire per household.

During this survey, complete pregnancy histories, including live births, stillbirths and abortions, were recorded to decrease the likelihood of missing births and deaths. The previously used calendar of local events was updated and expanded to include calendars of Islamic and Persian festivals and the Persian Calendar (see Appendix II).

As in the previous surveys, children between the ages of one and four were included in the anthropometric assessment. In NWFP/Punjab, every fourth child between one and four was included. Due to the smaller overall sample (and not expecting substantially different levels of malnutrition) every third child was measured and weighed in Balochistan. The same standard CDC measuring boards as in the previous surveys were used. Length was measured in supine position in children under 85 cm; children over 85 cm were measured standing up. SALTER spring balance scales were used for weighing.

For all living children under five, questions on the initiation of breastfeeding and the occurrence of diarrhoea during the two weeks and the 24 hours prior to the survey were asked. For a woman's youngest living child, questions on breastfeeding (current status, exclusive vs. supplemental) were asked.

Data collection

The surveys were carried out in collaboration between UNHCR and a non-governmental organization, Medecins Sans Frontieres, Holland, which manages two permanent survey teams in Peshawar and Quetta. All interviewers were Pakistani women from the area who speak Pashto (spoken by the majority of refugees) and who also have a good command of English. All had previously been health professionals (nurse or "lady health visitor") and were now full-time survey workers, experienced in household surveys among the Afghan refugees. All had participated in recent immunization coverage and diarrhoeal disease surveys. There was one expatriate supervisor for a team of four interviewers in Quetta, and two expatriate supervisors for two teams of three interviewers in Peshawar. A 25-page interviewer manual was prepared. Separate interviewer training sessions were conducted in Peshawar and Quetta. Survey workers were briefed on the purpose of the survey and the methodology used. With lectures and role-playing exercises, they were then trained in using the survey instrument during one week. One day was devoted to teaching anthropometric skills, using CDC-designed measuring boards and SALTER spring balance scales. A field trial was conducted in a camp not selected for the survey at the end of the week.

Methods of analysis

After completion of each cluster, the supervisor entered cluster totals into a prepared computer spreadsheet, which produced preliminary results. It calculated infant and neonatal mortality rates with confidence intervals based on the cluster design, as well as the proportion of children who fell into several intervals of the percent of the median weight-for-height, as compared to the NCHS/CDC reference population.

For the final analysis, copies of all questionnaires were made and sent to CDC, Atlanta, where they were entered into a micro-computer using the EPI-Info, Version 5, software package. A new anthropometric sub-module calculated

individual z-score, percentile and percent median values for height-for-age, weight-for-height and weight-for-age as compared to the reference population.

Nutritional anthropometry indices (weight-for-height, height-for-age and weight-for-age) of the refugee children using distributions of z-scores (standard deviation units) and percent of median relative to the WHO/NCHS reference population were tabulated and graphed to display the results of the anthropometrical measurements.

Infant and neonatal mortality rates were calculated as period rates for the time period between February 1989 and January 1990. This was accomplished by dividing the number of children who had died during that period and were less than one year old (less than one month old) at the time of death by the number of children born alive (who had cried at all) during the same period. Pooled weighted averages were used to calculate the all-area mortality estimates. Since dates of birth and death were available for all children born during the last five years, it was possible to calculate cohort infant mortality rates for the four preceding 12-month periods. Cohort rates were produced by using all live births during a one-year period and dividing the number of infant deaths that occurred to this cohort up to the end of the next year through the number of births in the cohort. Under-five mortality was estimated with a life-table method of calculation, using age-specific mortality rates for the past year, as well as with period mortality rates, dividing the number of deaths under age five in one year by the number of live births in the same year.

When deaths were reported, mothers were asked about the symptoms the child had shortly before death. In addition to diarrhoea and respiratory symptoms (difficulty breathing, cough) two diseases were asked (measles, malaria), because their symptomatology is supposedly well-known among the population. For all deaths under one month of age, the main symptoms of neonatal tetanus were asked. In the analysis, a neonatal death was considered related to neonatal tetanus, if the answer was yes to any three of the four elicited symptoms.

Distributions of weight and height measurements were tabulated using the percent median and the z-score distribution of the WHO/NCHS reference population. The z-score gives the distance between a given measurement for

UNITED NATIONS
HIGH COMMISSIONER
FOR REFUGEES



Evaluation of Infant Mortality and Childhood Nutritional Status Among Afghan Refugees in Pakistan, 1990

Rudolf H. Tangermann, MD
Elsie Pamuk, PhD

Centers for Disease Control

In collaboration with staff of the
United Nations High Commissioner for Refugees and
Medecins Sans Frontieres, Holland,
in Islamabad, Peshawar and Quetta, Pakistan